Amendments

In the specification

Kindly amend the specification as follows:

On page 10, line 13, amend "No. _____ entitled" to read --No. 09/259,795, entitled--.

On page 13, line 1, amend "_____ (VTN-443)" to read --09/259,796, (VTN-443)--.

On page 14, line 10, amend "Application _____ (VTN-443)" to read -- Application 09/259,796, (VTN-443)--.

On page 18, line 16, amend "_____, earlier" to read --09/259,795, earlier--.

Remarks

The outstanding Office Action rejected claims 1-50 under 35 U.S.C. §103 over Clark et al, US Patent 5,786,598 (hereinafter Clark), in view of Matner et al, US Patent 5,252,484 (hereinafter Matner), and further in view of Shalaby et al, US Patent 5,422,068, (hereinafter Shalaby), Osipo et al, US Patent 5,271,874 (hereinafter Osipo), Dunn et al, US Patent 4,910,942 (hereinafter Dunn) and Heyl et al, US Patent 5,431,879 (hereinafter Heyl). The rejections are traversed and reconsideration of claims 1-50 in light of the remarks which follow is respectfully requested.

Amendments were made to the specification to fill in the missing Serial Numbers for US applications that are incorporated into the specification. These amendments add no new matter because each application was identified by the Applicants' docket number that was present on each of the applications as filed in the USPTO. Attached hereto is a marked-up version of the changes made to the specification by the current amendment. The attached page is captioned "Version with markings to show changes made." It is therefore respectfully requested that these amendments be entered into the application.

Regarding the 35 U.S.C. §103 rejection of claims 1-50, the Office Action stat s:

"Clark et al teaches of a process and an apparatus for sterilizing a medical device, col. 1, lines 7-20, comprising the following: medical device, col. 1, lines 13-15; ultraviolet radiation, col. 3, lines 60-62; in the range of 240-280 nm, col. 3, line 3; is exposed at least 3.9 mj/cm^2, col. 8, lines 10-12; sterility assurance level of at least 10^-6, abstract, line 21; at least one pulsed radiation source, col. 6, line 26, and col. 3, lines 51-56; UV radiation is delivered in less than 1 millisecond, col. 8, lines 12-19; radiation sources pulse are pulsed substantially simultaneously, col. 10, lines 35-37; reflector, col. 6, line 26; radiation is delivered by pulsed radiation source in at most three pulses, col. 9, lines 62-67, and col. 10, lines 33-37; wherein the fluence of each flash lamp at the focal plane of reflector, figure 1 (22, and 20); wherein medical device is in a container, col. 4, lines 55-57; wherein medical device is a contact lens, col. 4, lines 55-57; container further comprises an aqueous solution, col. 8, line 4; container further comprises a non-preserved aqueous solution, col. 1, lines 10-13; a rare gas as a luminous component, col. 10, lines 20-25; more than one radiation source wired in series, figure 1 (22, and the arrows); modifying radiation from a radiation source to eliminate wavelengths which would damage medical device, col. 3, lines 33-38; wherein apparatus is light-tight, col. 8, lines 37-39; wherein at least one reflector directs radiation from radiation source to a treatment area, figure 1 (18); wherein reflectors have enhanced reflection in the ultraviolet, col. 6, lines 45-45; wherein container comprises thermoplastics, col. 7, lines 16-21, lines 36-37, and lines 44-47; container is transmissive to radiation in substantially all directions, col. 6, lines 45-55; container comprises a lid and a bowl, Clark et al further teaches of applying UV to a medical device to sterilize against spores, col. 9, lines 50-53, and provides examples of showing the sterilization effects of UV, or the D-values of spores, columns 10-12 (examples 1-2). In addition; Clark et al teaches of transmissivity of container to UV, col. 3, lines 56-62, to be known in the art, col. 9, lines 21-32. Furthermore; Clark et al teaches of medical device (contact lens) which blocks (UV-blocker) at least 50 percent of UV, col. 4, lines 12-19, and col. 8, lines 5-22. Clark et al further teaches that the container and the medical device (contact lens) can be damaged if the proper wave length is not selected, col. 3, lines 33-38. In addition, Clark et al teaches of using a power supply and a capacitance in order to generate radiation within the desired range, col. 10, lines 1-8."

"Clark et al does not disclose a process and an apparatus for sterilizing a medical device comprising: Bacillus stearothermophilus (ATCC 7935), a container with at least 50% transmissivty to

UV light, forming contact lens, radiation is produced by a laser, container comprises a lid and a bowl, and hermetically sealed container."

"Matner et al teaches of a method for determining the efficacy of a sterilization cycle, col. 1, lines 7-8, wherein it is know to use Bacillus stearothermophilus (ATCC 7935) to verify how efficient a sterilization cycle is, col. 2, lines 35-39.

"Matner et al does not teach a method for determining the efficacy of a sterilization cycle comprising: a container with at least 50% transmissivity to UV light, forming contact lens, radiation is produced by a laser, container comprises a lid and a bowl, and hermetically sealed container.

"Shalaby et al teaches of methods of sterilization comprising, col. 2, lines 20-22; radiation source, col. 2, lines 20-48; wherein the concept of D-value is and its importance to sterility assurance level is explained, col. 3, lines 28-65; also the D-values of Bacillus stearothermophilus are shown, columns 6-11 (examples 1-6). Furthermore; Shalaby teaches of known mathematical relationship between transmissivity, and D-values, col. 3, lines 46-57.

"Shalaby et al does not teach of methods of sterilization comprising: a container with at least 50% transmissivity to UV light, forming contact lens, radiation is produced by a laser, container comprises a lid and a bowl, and hermetically sealed container.

"Osipo et al teaches of a method of forming contact lens, col. 1, lines 6-21; and also of hermetically sealed container, col. 3, lines 47-48.

"Osipo et al does not teach of a method of forming contact lens comprising: a container with at least 50% transmissivity to UV light is used, radiation is produced by a laser, and container comprises a lid and a bowl.

"Dunn et al teaches of a method for sterilizing packaging of medical devices, col. 1, lines 17-21, wherein a laser is used, col. 2, lines 17-22; a container with at least 50% transmissivity to UV light is used, col. 6, lines 15-20.

"Dunn et al does not teach of a method for sterilizing packaging of medical devices wherein the container comprises a lid and a bowl.

"Heyl et al teaches of a method for sterilizing and disinfecting, col. 1, lines 11-16, wherein the container comprises a lid and a bowl, col. 9, lines 35-37.

"Thus, it would have been obvious and one having ordinary skill in the art would have been motivated to combine the teaching of Clark et al for a system and a method of sterilizing a medical device by applying UV radiation to spores with another art-in the determining the efficacy of

sterilization cycles by specifically using Bacillus stearothermophilus (ATCC 7935) bacterial spore for the know and expected results that the known and expected results that the bacterial spore is recognized as the most resistant form of bacterial life and further all tests for determining sterilization efficacy use it."

Applicants traverse the rejection over the cited references. Applicants claim a proces of sterilizing a medical device comprising subjecting said medical device to uv radiation whereby the Dvalue of *Bacillus stearothermophilus* (ATCC 7953) is at least 3.9 mJ/cm^2 uv radiation (240-280 nm) to the spore. Further, Applicants claim a process of sterilizing a medical device comprising: subjecting said medical device to ultraviolet radiation wherein the minimum total energy density of said ultraviolet radiation (240-280 nm) to microorganisms on said medical device is at least 18 mJ/cm^2. Further, Applicants claim an apparatus for delivering UV radiation to a medical device for sterilization comprising: at least one radiation source and a reflector for each said radiation source wherein at least one said reflector directs radiation from each said radiation source to a treatment area, such that at least 3 J/cm^2 broad spectrum radiation of which at least 50 mJ/cm^2 of said radiation is UV radiation (240-280 nm) reaches said treatment area, said treatment area is located at the focal plane of said reflector, and further said treatment area is where said medical device is placed to receive the radiation. None of the references cited by the Office Action, alone or in combination, teach or suggest Applicants invention of claims 1-50.

The Office Action has pieced together references which mention similar terms as those found in Applicants claims; however, a hindsight reconstruction of references does not satisfy the requirement that there be some teaching or suggestion in a reference that makes Applicants' invention obvious. Additionally, the Office Action does not specify to which claims any of its statements are directed; therefore, Applicants were unsure of the rejections, but have made an effort to reply herein.

There is no teaching or suggestion in Clark what microorganism would be the greatest chall nge to kill using Applicants' invention, nor does Clark teach or suggest a Dvalue, nor does Clark teach or suggest any required minimum nergies to achieve sterility.

Prior to Applicants' diclosure, it was believed and disclosed that *Aspergilus* spores were the most resistive to the effects of uv radiation. See Gritz et al, "Ultraviolet Radiation for the Sterilization of Contact Lenses", the CLAO journal, Oct. 1990, vol. 16, number 4, or Nirankari, "Sterilizing Contacts with Ultraviolet Light", Research to Prevent Blindness Science Writers Seminar. (These references were cited to the USPTO by Applicants in an IDS mailed on October 3, 2000). However, Applicants' discovered that *Bacillus stearothermophilus* (ATCC 7953) was the hardest to kill, and the one for which a Dvalue should be determined to provide the required sterility assurance level for this method of sterilization. That was not taught nor suggested by the closest prior art, and was actually unexpected based on the prior art teachings and the characteristics of *Aspergilus niger* that were thought to protect it against the effects of uv radiation.

Further, Applicants claim a specific amount of uv radiation that each microorganism must receive inorder to sterilize the microorganism. There is no teaching or suggestion in Clark as to what is the amount of energy that must reach each microorganism. Clark teaches broad ranges of energy and duration at col. 8, lines 10-15, but does teach what is the minimum amount of energy necessary to sterilize the microorganisms. Further, Clark does not teach nor suggest a total quantity of energy to be delivered to a treatment area and what portion of it should be in the uv range to result in sterilization.

The Office Action states that Clark teaches that the light source comprises wavelengths between 240-280nm, and although it does teach that a source would include light between 180 nm to 300 nm at col. 3, lines 60-65, it doesn't state how much of the radiation in that range is needed for sterility. The Office Action states that Clark teaches exposure to 3.9 mJ/cm^2 at col. 8, lines 10-12; however, that is not true, because Clark specifies a lowest amount of 0.01 J/cm^2 at col. 8, lines 10-12, which is far greater than 3.9 mJ/cm^2. Clark mentions a sterility assurance level in the abstract, but there is no teaching in Clark how to obtain that sterility assurance level.

The Office Action states that Clark teaches that the radiation sources are pulsed substantially simultaneously, and cites col. 10, lines 35-37. Applicants failed to see where that was stated. The Offic Action states that Figure 1 shows that the fluence of each flash lamp is at the focal plane of the reflector; however, Applicants

claim an amount of fluence that is not taught nor suggested by Clark. The Office Action states that the container further comprises a non-preserved solution; however, at col. 8, line 19 the solution is described as a preservative fluid. The Office Action states that the radiation sourc is wired in series and cites figure 1 as showing that; however, figure 1 is not described as having radiation sources that are wired in series. The Office Action states that Clark teaches modifying radiation from a radiation source to eliminate wavelengths which would damage a medical device, col. 3, lines 33-38; however, Applicants disagree. At col. 3, lines 33-38, Clark teaches the use of uv radiation instead of the prior art techniques of gamma irradiating or autoclaving to avoid damage to the package. The Office Action states that Clark teaches an apparatus that is light-tight at col. 8, lines 37-39. Applicants disagree. Clark no where teaches nor suggests using a light-tight apparatus and shows a tunnel having open ends in the figure. The Office Action states that Clark teaches reflectors that have enhanced reflection in the ultraviolet, col. 6, lines 45-45; but that is not true. Col. 6, lines 45-45 states that the reflectors reflect light across the entire spectrum. The Office Action states that Clark teaches a container that is transmissive to radiation in substantially all directions, col. 6, lines 45-55; but for the container that comprises a lid and a bowl, Clark shows that light is directed at its bowl, and states that the container comprises a foil lid which is not transmissive at col. 8, lines 31-32.

The Office Action states that Clark provides examples of showing the sterilization effects of UV, or the D-values of spores, columns 10-12 (examples 1-2); however, there are no Dvalues calculated. Further, Clark states that sterility assurance levels of 10^{-6} are shown which is not supported by the data generated.

The Office Action states that Clark teaches a medical device which blocks at least 50 percent of UV, col. 4, lines 12-19, but no where does Clark teach or suggest a contact lens comprising uv blocker. Clark et al further teaches that the container and the medical device (contact lens) can be damaged if the proper wavelength is not selected, col. 3, lines 33-38, again that was a discussion of damage using gamma irradiating and autoclaving methods, and has nothing to do with damage or avoiding damage when using Clark's method. In addition, Clark et al teaches capacitance at col. 10, lines 1-8, but not within the range disclosed and claimed by Applicants.

The Office Action states that Clark does not disclos a process and an apparatus for sterilizing a medical device comprising: *Bacillus stearothermophilus* (ATCC 7935), a container with at least 50% transmissivty to UV light, forming contact lens, radiation is produced by a laser, container comprises a lid and a bowl, and hermetically sealed container. For these reasons as well as all the reasons given above, Clark fails to make Applicants' invention of claims 1-50 obvious. It is therefore, respectfully requested that the 35 U.S.C. §103 rejection of claims 1-50 over Clark be withdrawn.

Matner is cited by the Examiner, because Matner discloses a method of determining the efficacy of a sterilization cycle by using an active enzyme which may be isolated from *Bacillus stearothermophilus.* Matner does teach that the source of the enzyme may be from an organism or microorganism, such as *Bacillus stearothermophilus* or *Bacillus subtilis.* However, Applicants do not teach or suggest isolating an enzyme from *Bacillus stearothermophilus* for determining the efficacy of Applicants method. Additionally, although Matner states that his method is applicable to steam, dry heat, radiation, ethylene oxide or other gaseous or liquid agent sterilization methods, Matner describes *Bacillus stearothermophilus* as the preferred (source of) material for determining the efficacy of steam sterilization (col. 5, lines 65-col. 6, line 1), but describes no microorganism that is the prefererred material to be used to monitor uv radiation sterilization. Matner states that Bacillus and Clostridia species are the most commonly used to monitor sterilization processes utilizing saturated steam, dry heat, gamma irradiation and ethylene oxide, but there is no teaching or suggestion to use *Bacillus stearothermophilus* for a uv radiation method; therefore, Matner makes *Bacillus stearothermophilus* no more than obvious to try in Applicants invention which is not a proper measure of 35 U.S.C. §103 obviousness. Therefore, Matner alone or in combination with Clark does not teach nor suggest Applicants' invention. It is therefore respectfully requested that the 35 U.S.C. §103 rejection of claims 1-50 over Clark in view of Matner be withdrawn.

Shalaby was cited by the Examiner, because it teaches Dvalue and sterility assurance level, and Dvalues for *Bacillus stearothermophilus* are shown. Applicants did not see wher the Dvalues for *Bacillus stearothermophilus* were shown; however, even if they were disclosed they would not be equivalent nor applicable to

the Dvalue for the amounts of uv radiation required to destroy th same microorganism in Applicants' invention. Shalaby indicates that the indicator for gamma irradiation is *Bacillus pumilus,* and Manter indicated that *Bacillus stearothermophilus* was the indicator for steam sterilization; therefore, these references show that different sterilization techniques will have different microorganisms that are most difficult to sterilize using that technique, and that the results using one technique will not make the results when using another technique predictable, or obvious.

The Office Action states that Shalaby teaches of a known mathematical relationship between transmissivity and Dvalues, col 3, lines 46-57. Applicants disagree. Applicants did not see any discussion of transmissivity there.

The Office Action further states: "Shalaby et al does not teach of methods of sterilization comprising: a container with at least 50% transmissivity to UV light, forming contact lens, radiation is produced by a laser, container comprises a lid and a bowl, and hermetically sealed container." (Emphsis added). For all these reasons, Applicants believe that Clark in view of Matner and further in view of Shalaby fails to make Applicants invention obvious. It is respectfully requested that this rejection be withdrawn. In fact, the teachings of the references show how the results using one sterilization technique do not apply to another sterilization technique.

The Office Action cites Osipo for teaching a method of forming a contact lens and also of hermetically sealed container. Although Osipo does not specifically state that the contact lens container is hermetically sealed, such a container has been in use in the field for a number of years.

The Office Action further states: "Osipo et al does not teach of a method of forming contact lens comprising: a container with at least 50% transmissivity to UV light is used, radiation is produced by a laser, and container comprises a lid and a bowl." (Emphsis added). Even if Osipo teaches a hermetically sealed container, Applicants fail to see what that adds to the teachings of Clark, Matner and Shalaby to make Applicants' inventions obvious; therefore, it is respectfully requested that this rejection be withdrawn.

The Office Action cited Dunn for teaching a method for sterilizing packaging of medical devices wher in a laser is used and a container having at least 50%

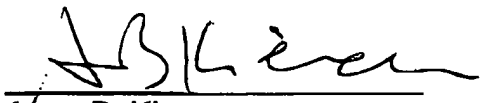
transmissivity is used. Applicants disagre . Dunn does not teach the use of a laser. Dunn teaches the use of polychromatic light. (Abstract). Dunn does mention that the surface of foodstuffs may be treated through a packaging material which is transmissive to 50% of the nergy; however Dunn stresses that the method it discloses to treat the surface of the foodstuff and surface of the packaging. Dunn states at col. 4, lines 15-19: "Moreover, the short duration of each pulse also permits under certain conditions, spatial localization of various of the preservative effects of the light pulses to a thin suface layer such as the surface of a food product, packaging material or medical device." Dunn does not teach nor suggest that the method can be used to sterilize anything but a thin surface layer of food, packaging or a medical device. Nor does Dunn teach or suggest the necessary Dvalues and energy levels to achieve sterility of the medical products as Applicants have claimed. Therefore, Dunn, alone or in combinaiton with Clark or the other references fails to teach or suggest Applicants' invention.

The Office Action cited Heyl for disclosing a method of sterilizing and disinfecting a contact lens in a container using a sterilizing or disinfecting solution using an antimicrobial agent in the presence of a scavenger element. Heyl, alone or in combination with the other references does not teach or suggest the necessary Dvalues and energy levels to achieve sterility of medical products which Applicant claims.

The Office Action further cites additional references that were not relied upon, but that were considered pertinent to applicant's disclosure, which were Clark et al (U.S.P.N. 5,786,598), Anderson et al (U.S.P.N. 4,528,268), Clark et al (U.S.P.N. 5,925,885), Boucher (U.S.P.N. 3,753,651), Sizer et al (U.S.P.N. 5,843,374), Loshaek et al (U.S.P.N. 5,491,091), and Dunn et al (U.S.P.N. 4,871,559). These references fail to teach or suggest Applicants' claimed inventions. Therefore, Applicants' inventions of claims 1-50 are patentable over those additional references.

For all the reasons above, it is presently believed that the application consisting of claims 1-50 is presently in condition for allowance. Early allowance is solicit d.

Respectfully submitted,



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VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the specificati n:

Paragraph beginning at line 21 of page 9 has been amended as follows:

Containers which are useful in this invention are any of the known containers which are or can be hermetically sealed as long as the containers are at least partially transmissive to ultraviolet radiation (240-280 nm). The containers can be UV transmissive glass, thermoplastic pouches and bags, cyclic olefin copolymers, injection molded or thermoformed plastic containers, and conventional bowls and lids for contact lenses, as long as enough ultraviolet radiation (240-280 nm) can penetrate the container to sterilize the contents of the container. It is presently preferred that the contact lens container comprises a bowl and a lid. It is preferred that the material or materials of at least the bowl of the container are at least partially transmissive to ultraviolet radiation. Particularly, for the sterilization of a contact lens comprising UV-blocker, it is even more preferred that the bowl and the lid are at least partially transmissive to ultraviolet radiation, preferably in all directions. To accomplish this, it is preferred to replace the conventional foil lid with a thermoplastic lid, which may consist of one or more layers of, for example, polyolefins, such as, polyethylenes, polypropylenes, polybutylenes, and copolymers of the above; cycloolefins (COC); halogenated films, such as polyvinychlorides (PVC), polyvinylidine chlorides (PVDC), polyvinylidene fluorides, polymonochlorotrifluoroethylenes (PCTFE), polyvinylidine fluorides (PVDF), and polyfluorocarbons; polyurethanes; polyamides; polyimides; ethylene-vinyl acetate copolymers (EVA); ethylene vinyl alcohols (EVOH); ethylene acrylic acid copolymers (EAA); acrylics, such as polymethylmethacrylates; ionomers; and cellulose materials, such as cellulose esters, and cellophanes. It is presently preferred that the bowl is a polyolefin, and the lid is a multilayered structure comprising polypropylene. The materials of the bowl and the lidstock should preferably be free of any component that will scatter light. The most preferred method of sealing the container is to heat seal the thermoplastic lid to the thermoplastic bowl. The most preferred containers and materials for the container are described in a simultaneously filed application by James Peck, et al, U.S. Serial No.[ ] 09/259,795, entitled "Package for Medical Device" (VTN-445) which is incorporat d h rein by reference.

Paragraph beginning at line 32 of page 12 has been amended as follows:

Note that the monitoring system that was us d to measure all the spectroradiometric energies reported herein is further described in Ebel, et al, US Patent Application [_____] 09/259,796, (VTN-443) entitled "Sterilization System", filed concurrently herewith, and incorporated herein by reference. The monitoring system disclosed in Ebel et al, can measure differences in the spectroradiometric output of each flash, even if the total energy level of the flash does not change. That application indicates in an example the importance of measuring the spectroradiometric radiation, because in the preferred embodiment, a measurement of the broad spectrum radiation does not indicate if the amount of UV radiation (240-280 nm) as a portion of the total radiation has dropped below the necessary amount to achieve sterilization.

Paragraph beginning at line 7 of page 14 has been amended as follows:

Additional benefits of a pulsed ultraviolet radiation system over a continuous ultraviolet radiation system is that it generates less heat, and that the system can be monitored to verify that a suitable spectrum was generated for every flash, using the monitoring system disclosed in Ebel et al., U.S. Patent Application [_____] 09/259,796, (VTN-443) entitled "Sterilization System", earlier incorporated herein.

Paragraph beginning at line 11 of page 18 has been amended as follows:

Microbiological evaluation of the effectiveness of the system was conducted using containers, consisting of bowls and lidstock, (both about 50 percent transmissible to UV radiation (240-280 nm)), holding UV-blocking contact lenses (20% transmissive to 240-280 nm) in a non-preserved solution of buffered borate. The contact lens containers were made according to Example 1 in "Package for Medical Device" (VTN-445), U.S. Serial No. [_____] 09/259,795, earlier incorporated herein. The test microorganism was added at a concentration of 10^4 colony forming unit/package (cfu/pkg). The closed intact containers were centered between the lamps and simultaneously subjected to 25 mJ/cm^2 (240-280 nm) from each lamp. One hundred containers containing Aspergillus niger (ATCC 16404), Bacillus stearothermophilus (ATCC 7953) spores or Bacillus subtilis (ATCC 9372)

spores were exposed to 1-flash for a total of 50 mJ/cm^2 UV radiation (240-280 nm) (25 mJ/cm^2 per lamp) from both the top and bottom lamps. The containers inoculated with Aspergillus niger (ATCC 16404) were then processed in a laminar flow hood whereby the entire contents of the container were placed into potato dextrose broth and incubated at 25° C for 14 days. The containers inoculated with Bacillus spore preparations were transferred to tubes containing 40 ml of trypticase soy broth and incubated for 14-days at 35-37°C. This tube terminal sterilization method allows for the detection of the viability of 1-single cell. After 14-days of incubation, the tubes were visually evaluated for turbidity and designated as positive for growth or negative for no growth. The positive tubes were subsequently identified and confirmed as the microorganism inoculated in the test. This experiment was repeated with 100 additional tubes for 2 flashes (50 mJ/cm^2 cumulative exposure from each lamp (240-280 nm)) both lamps flashing simultaneously, and repeated again for 3 flashes (75 mJ/cm^2 cumulative exposure from each lamp (240-280 nm)) both lamps flashing simultaneously. The number of test tubes with viable test microorganisms out of the one hundred tested at each energy level were recorded in Table 1.